



The Energy Story

Chapter 10: Wind Energy

Wind can be used to do work.

The kinetic energy of the wind can be changed into other forms of energy, either mechanical energy or electrical energy.

When a boat lifts a sail, it is using wind energy to push it through the water. This is one form of work.

Farmers have been using wind energy for many years to pump water from wells using windmills like the one on the right.

In Holland, windmills have been used for centuries to pump water from low-lying areas.

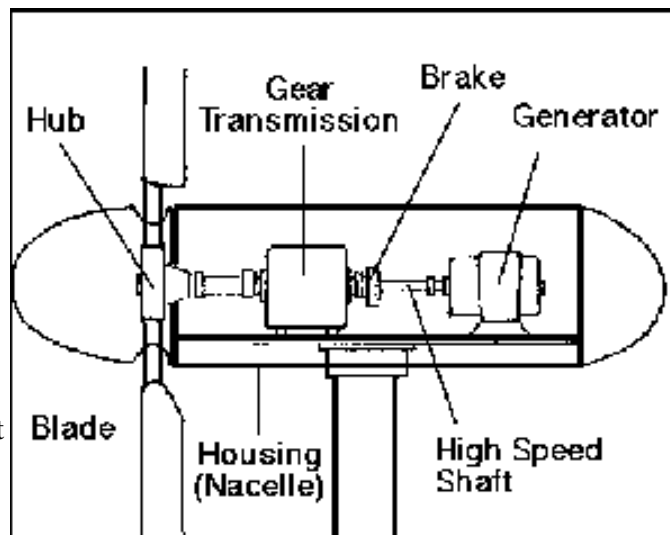
Wind is also used to turn large grinding stones to grind wheat or corn, just like a water wheel is turned by water power.

Today, the wind is also used to make electricity.

Blowing wind spins the blades on a wind turbine -- just like a large toy pinwheel. The blades are attached to a hub that is mounted on a turning shaft. The shaft goes through a gear transmission box where the turning speed is increased. The transmission is attached to a high speed shaft which turns a generator that makes electricity.

If the wind gets too high, the turbine has a brake that will keep the blades from turning and being damaged.

We have many windy areas in California. The only problem with wind is that it is not windy all year long. It is usually windier during the summer months when wind rushes inland from cooler areas, like the ocean to replace hot rising air in California's warm central valleys and deserts.



And wind speeds must be above 12 to 14 miles per hour to turn the turbines fast enough to generate electricity. The turbines usually produce about 50 to 300 kilowatts of electricity each. A kilowatt is 1,000 watts (kilo means 1,000). You can light ten 100 watt light bulbs with 1,000 watts. So, a 300 kilowatt (300,000 watts) wind turbine could light up 3,000 light bulbs that use 100 watts.

As of 1995, there were 13,437 wind turbines in California. These turbines are grouped together in what are called wind "farms." These wind farms are located mostly in the three windiest areas of the state:



- Altamont Pass east of San Francisco
- San Geronio Pass near Palm Springs
- Tehachapi south of Bakersfield

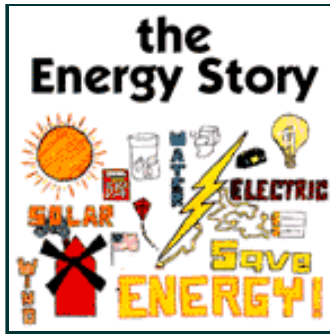
Together these three places make enough electricity to supply an entire city the size of San Francisco with power! About 30 percent of the world's wind-generated electricity is found in California. Other countries that use a lot of wind energy are Denmark and Germany.

But once electricity is made, it has to get from the wind turbines to our homes, factories and schools. The electricity transmission system is discussed in our next chapter.

Here's What We Learned

1. Wind energy can be used to do work.
2. Wind has been used for many years to drive boats and in windmills to grind grains or pump water.
3. Wind turbines are being used today to make electricity.
4. Wind spins the large blades which turn generators inside the turbine to make electricity.
5. California's nearly 13,500 wind turbines can supply enough electricity to power an entire city.

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